

# The ASTHMA EPIDEMIOLOGY Update

Spring/Summer 2013

This **Asthma Epidemiology Update** presents the most recent available data on North Carolina adult asthma prevalence, asthma among school children, emergency department (ED) visits for asthma, and inpatient hospitalizations for asthma.

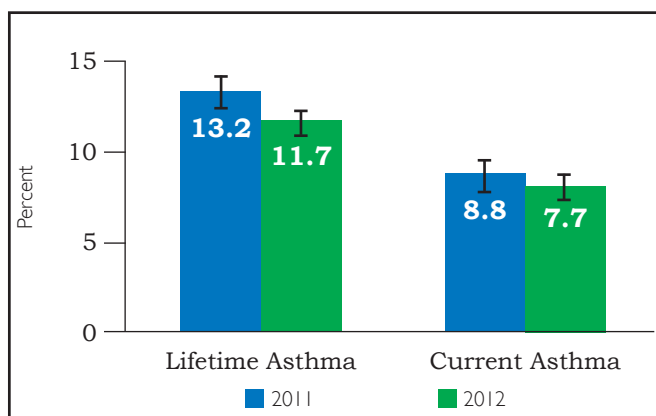
## Adult Asthma Prevalence

The Behavioral Risk Factor Surveillance System (BRFSS) is a health survey of state residents aged 18 and older in households with telephones. As part of the core BRFSS survey, adult respondents are asked two asthma prevalence questions:

- 1) Have you ever been told you have asthma?
- 2) Do you still have asthma?

As presented in **Figure 1**, the prevalence of both current and lifetime asthma among North

**Figure 1. Prevalence of Adults with Lifetime and Current Asthma, North Carolina, 2011-2012**

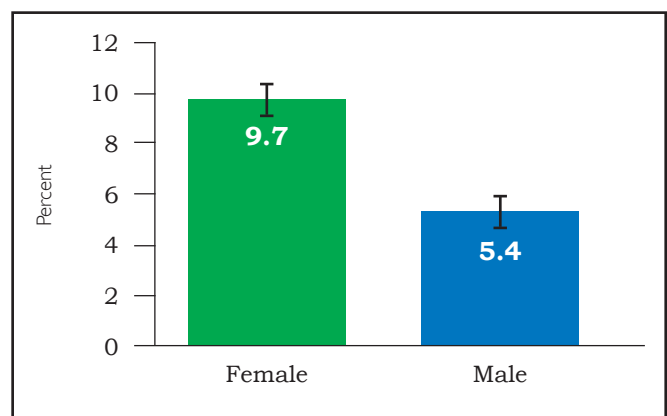


Source: 2011-2012 North Carolina Behavioral Risk Factor Survey System (N.C. BRFSS).<sup>2</sup>

Carolina resident adults decreased from 2011 to 2012, however these differences were not statistically significant.<sup>1,2</sup> Due to significant changes in methodologies for sampling and weighting the BRFSS survey data, comparisons with data collected prior to 2011 are not available.<sup>3</sup>

**Figure 2** presents current adult asthma prevalence by gender. Asthma prevalence was higher for females (9.7%) than males (5.4%) in 2012. This difference was statistically significant.

**Figure 2. Prevalence of Adults with Current Asthma by Gender, North Carolina 2012**

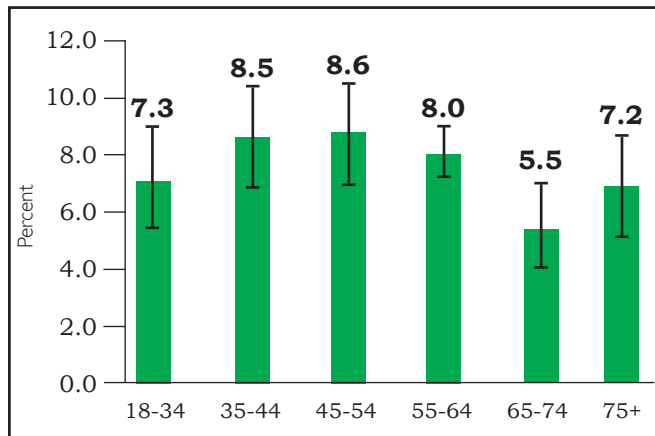


Source: 2012 North Carolina Behavioral Risk Factor Survey System (N.C. BRFSS).<sup>2</sup>

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As noted in **Figure 3**, current asthma prevalence was higher among North Carolina adults ages 35-54 in 2012. However, this difference was only significant when compared with the 65-74 age group that had the lowest prevalence.

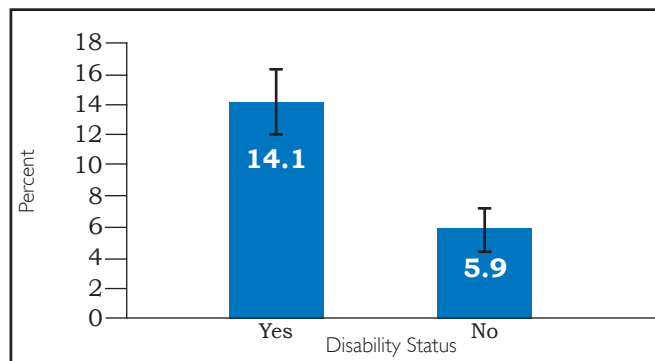
**Figure 3. Prevalence of Adults with Current Asthma by Age Group, North Carolina 2012**



Source: 2012 North Carolina Behavioral Risk Factor Survey System (N.C. BRFSS).<sup>2</sup>

The prevalence of current asthma was more than two times higher among North Carolina adults with a disability (14.1%) compared with those without disability (5.9%) in 2012 (see Figure 4).

**Figure 4. Prevalence of Adults with Current Asthma by Disability Status, North Carolina 2012**



Source: 2012 North Carolina Behavioral Risk Factor Survey System (N.C. BRFSS).<sup>2</sup>

Since 2011, BRFSS survey has defined disability status based on two questions:

- 1) Are you limited in any way in any activities because of physical, mental, or emotional problems?
- 2) Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?

## Asthma Management Among Adults

North Carolina also conducts a call-back survey of adults who reported having asthma on the N.C. BRFSS survey. Below are key findings from North Carolina's 2011 Adult Asthma Call-Back Survey<sup>4</sup>:

- Almost half of North Carolina's asthmatic adults (46.2%) reported having an asthma attack or episode in the past year.
- Approximately six in ten asthmatic adults (60.7%\*) reported having a routine doctor visit in the past year.
- Among North Carolina adults with current asthma, only 29.1 percent\* reported receiving an asthma management plan.
- The estimated percent of asthmatic adults who reported taking an asthma management course was 12.0 percent.
- Approximately 40 percent of asthmatic adults (40.4%\*) reported that they had been advised to make environmental changes to help control their asthma.
- The estimated percent of North Carolina adults who reported using an inhaled corticosteroid in the past three months was 39.8 percent\*.
- Approximately half of North Carolina adults with asthma (51.0%\*) reported using inhaled, short acting, beta agonists.
- Nearly one in four North Carolina adults with current or former asthma (37.8%\*) reported also having a medical diagnosis of depression.
- A third of North Carolina asthmatic adults (32.2%) reported that they had missed days of work or usual activities due to their asthma.
- Two-thirds of North Carolina adults with asthma (75.4%\*) reported that they had experienced activity limitations as a result of their asthma.
- Approximately one in five asthmatic adults reported that their asthma was caused or made worse by their current job (20.1%\*).
- Nearly half of North Carolina adults with asthma (49.1%\*) reported that their asthma was caused or made worse by a current or former job.

\* Note: The 95% confidence interval was greater than 20. Estimates should be interpreted with caution.

## Asthma Prevalence in North Carolina Public Schools<sup>5</sup>

According to the North Carolina School Health Services Report, more than 1.4 million children (1,417,657) were enrolled in North Carolina K-12 public schools during the 2011-2012 school year; an increase of 8,473 students from the 2010-2011 school year.<sup>5</sup>

The unduplicated number of students with chronic health conditions, as reported by school nurses, was 232,183 in 2011-2012; equating to approximately 16.4 percent of all public school students in the state. As shown in **Table 1**, in 2011-12, asthma was the most common chronic health condition reported by school nurses; with 105,542 public school students (7.4%) known to school nurses to have asthma.

**Table 1: Number of K-12 Public School Students with Chronic Conditions, North Carolina School Year 2011-2012**

	All Chronic Conditions*	--- Asthma
<b>Elementary</b>	148,994	57,718
<b>Middle</b>	70,584	25,724
<b>High School</b>	66,384	22,100
<b>Total</b>	<b>285,962</b>	<b>105,542</b>

\*Includes students diagnosed with multiple chronic conditions

**Source:** North Carolina Annual School Health Services Report, 2011-12.

Approximately half (52%) of K-12 students with asthma had an Individual Health Plan (IHP) completed by a school nurse. A total of 823 asthmatic students (1%) had a related 504 plan.

During the 2011-2012 school years, asthma was the most frequent topic for school nurse counseling sessions. School nurses conducted a total of 47,379 health counseling sessions in 2011-12; representing 19 percent of all counseling sessions conducted. The majority of asthma counseling sessions (63%) were conducted with elementary school students.

In school year 2011-12, a total of 59 North Carolina school districts had formalized case management programs aimed at increasing the ability of students to manage chronic health conditions. As shown in **Table 2** below, the majority of asthmatic students demonstrated positive health improvements as a result of school nurse case management.

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**Table 2: Student Outcomes of School Nurse Case Management for Asthma, North Carolina 2011-12**

Asthma Student Outcomes	Number of Students Measured	Number of students who demonstrated improvement	Percent of students measured who demonstrated improvement
1. Consistently verbalized accurate knowledge of pathophysiology of their condition	2,124	1,770	83%
2. Consistently demonstrated correct use of asthma inhaler and/or spacer	2,328	2,062	89%
3. Accurately listed his/her asthma triggers	2,142	1,827	85%
4. Remained within acceptable peak flow/pulse oximetry parameters according to care plan	506	395	78%
5. Improved amount and frequency of regular physical activity	1,169	956	82%
6. Improved grades	810	600	74%
7. Decreased number of absences	1,168	941	81%

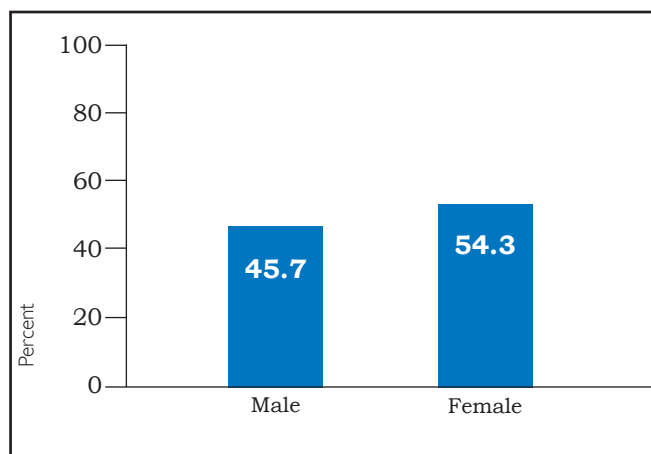
Source: North Carolina Annual School Health Services Report, 2011-12.

Asthma education is important for both staff and students. In school year 2011-12, 50 North Carolina school districts (43%) presented asthma education programs for staff and 33 school districts (29%) provided asthma education programs for students.

### Emergency Department (ED) Visits for Asthma<sup>6</sup>

In 2012, nearly 97,000 emergency department visits were recorded with a primary or secondary diagnosis of asthma. Among those visits, 49.5 percent (47,646) had a primary diagnosis of asthma and 50.5 percent (48,914) had a secondary diagnosis of asthma (ICD-9CM codes 493.00 - 493.99). Since there is no evidence that the patients were treated for asthma based on their secondary diagnosis, only those visits with a primary diagnosis of asthma are reported here. In 2012, slightly more than half (54.3%) of North Carolina ED visits for asthma occurred among females and 45.7 percent occurred among males, as shown in **Figure 5**.

**Figure 5. Emergency Department Visits with a Primary Diagnosis of Asthma by Gender, North Carolina 2012**

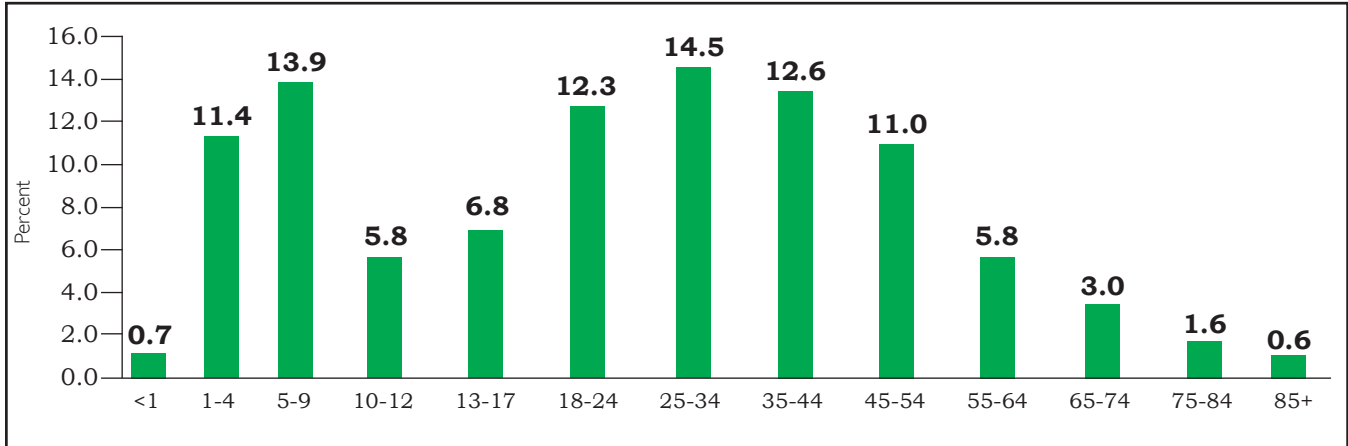


Source: North Carolina Disease Event Tracking and Epidemiological Tool (N.C. DETECT) Emergency Department Data, 2012<sup>6</sup>

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**Figure 6** presents the percentage of all 2012 North Carolina ED visits that were for asthma by age group. In 2012, the 25 to 34 age group had the highest percentage of ED visit for asthma (14.5%) and ages 85 and older had the lowest percentage (0.6%). Among children (17 and younger), the 5 to 9 age group had the highest percentage (13.9%) and infants (under one year) had the lowest (0.6%).

**Figure 6. Percentage of Emergency Department Visits with a Primary Diagnosis of Asthma by Age Group, North Carolina 2012**



Note: Light purple represents children and dark purple represents adults.

Source: North Carolina Disease Event Tracking and Epidemiological Tool (N.C. DETECT) Emergency Department Data, 2012<sup>6</sup>

## Hospital Admission

Among ED visits for asthma, approximately 90 percent of patients were discharged to home or self-care and 10 percent were admitted to the hospital. **Table 3** presents the numbers and percentages of ED visits with a primary diagnosis of asthma that resulted in a hospital admission by age. The age group 45-54 had the highest hospital admission rate (16.2%) and infants (less than one year) had the lowest (0.6%).

**Table 3: Number and percentage of Emergency Department visits with a primary diagnosis of asthma admitted to the hospital by age group, North Carolina 2012**

Age Group	Number	Percentage
<1	31	0.6
1-4	596	12.3
5-9	516	10.7
10-14	229	4.7
15-17	68	1.4
18-24	221	4.6
25-34	393	8.1
35-44	662	13.7
45-54	783	16.2
55-64	576	11.9
65-74	394	8.1
75-84	253	5.2
85+	117	2.4
Total	4,839	100.0

Source: North Carolina Disease Event Tracking and Epidemiological Tool (N.C. DETECT) Emergency Department Data, 2012<sup>6</sup>

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## Source of Payment

A little more than half of all emergency department visits with a primary diagnosis of asthma (52.3%) listed government sources (Medicaid, Medicare and other government) as the primary source of payment. Medicaid represented the largest percentage of ED visits (40.1%). More than one in five asthma ED visits (23.4%) occurred to self-pay patients.

**Table 4: Principal source of payment for ED visits with a Primary Diagnosis of Asthma, North Carolina 2012**

Principal Source of Payment	Number of visits	%
Private Insurance	9,651	20.1
Medicaid	19,249	40.1
Medicare	4,,567	9.5
Other government pay	1,308	2.7
Self-pay	11,256	23.4
Workers compensation	61	0.1
Unknown	322	0.7
Missing	1,603	3.3
<b>Total</b>	<b>48,017</b>	<b>100.0</b>

**Source:** North Carolina Disease Event Tracking and Epidemiological Tool (N.C. DETECT) Emergency Department Data, 2012<sup>6</sup>

## ED Rates

Rates of emergency department visits for asthma vary by county of residence. Pasquotank County had the highest age-adjusted asthma ED rate in 2012 (236.6 visits per 10,000) and Jackson County had the lowest age-adjusted asthma ED rate (7.5 visits per 10,000). **Table 5** shows the counties with highest age-adjusted asthma ED rates in 2012 and **Figure 7** presents a map of 2012 North Carolina ED rates for asthma by county of residence. Based on this data, it seems that the north east counties have higher rates of emergency department visits for asthma than the other parts of North Carolina.

**Table 5: Counties with the Highest Age-Adjusted Emergency Department Rates for Asthma, North Carolina 2012**

County	Count	Adjusted rate/10,000
Pasquotank	897	236.6
Richmond	602	137.0
Lee	719	123.0
Halifax	581	121.6
Camden	111	120.8
Perquimans	126	118.4
Cleveland	965	107.7
Bladen	338	103.6
Bertie	184	103.5
McDowell	403	102.4

**Source:** North Carolina Disease Event Tracking and Epidemiological Tool (N.C. DETECT) Emergency Department Data, 2012<sup>6</sup>

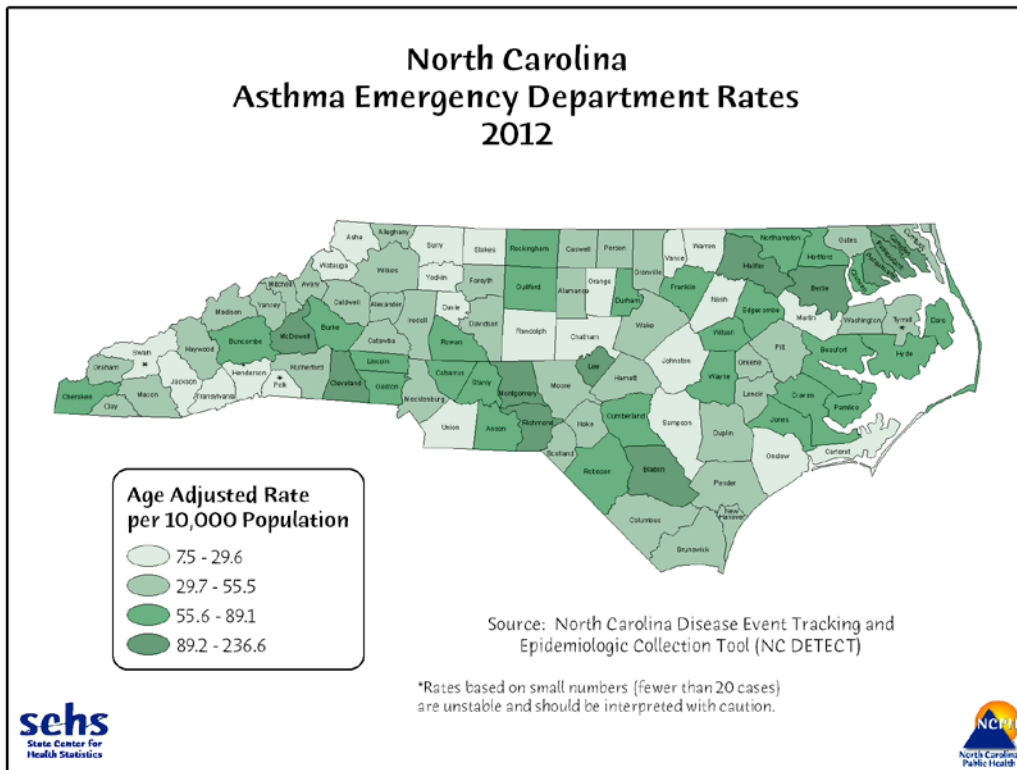
## Inpatient Hospitalizations for Asthma<sup>\*7</sup>

In 2012\*, asthma was the primary diagnosis for 9,786 North Carolina resident hospital discharges (ICD-9CM code 493). Overall in 2012, there were 100.3 asthma hospital discharges per 100,000 North Carolina residents. These numbers do not represent the number of patients since some patients may have been hospitalized more than one time during the 2012 calendar year.

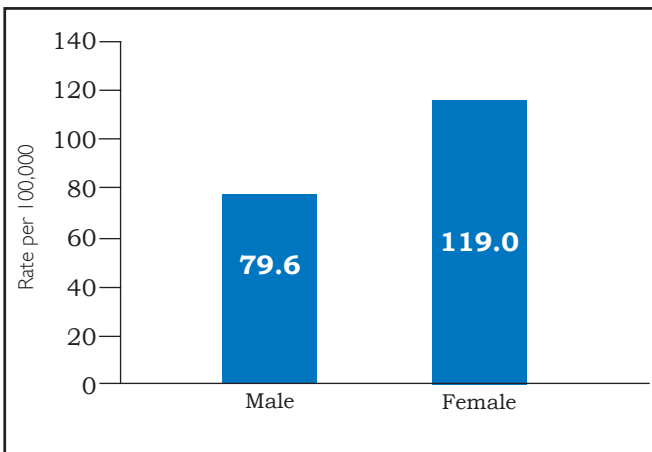
Females had a higher age-adjusted asthma hospital discharge rate than males (119.0 vs.79.6 per 100,000 residents), as shown in **Figure 8**.

\*Note: 2012 data in this report are provisional.

**Figure 7**



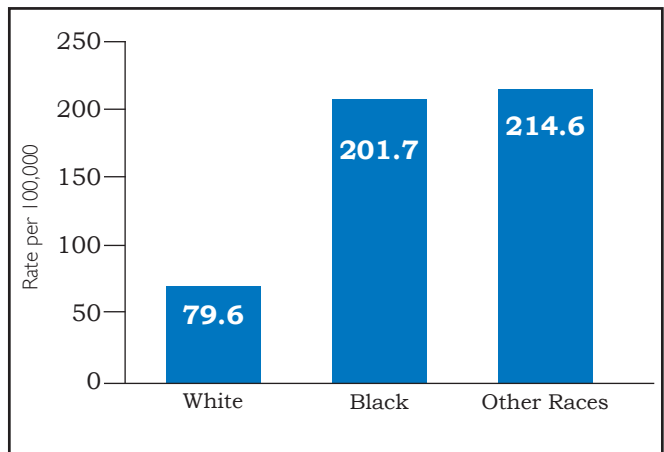
**Figure 8. Age Adjusted Hospital Discharge Rates per 100,000 population by Sex, 2012 North Carolina**



**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents: 2012  
 \*Note: 2012 data in this report are provisional.

Age-adjusted rates of asthma hospitalizations were more than three times higher for African-American/Blacks (201.7) and other races (214.6) compared with whites (60.7), as shown in **Figure 9**.

**Figure 9. Age Adjusted Hospital Discharge Rate per 100,000 population by Race, 2012 North Carolina**

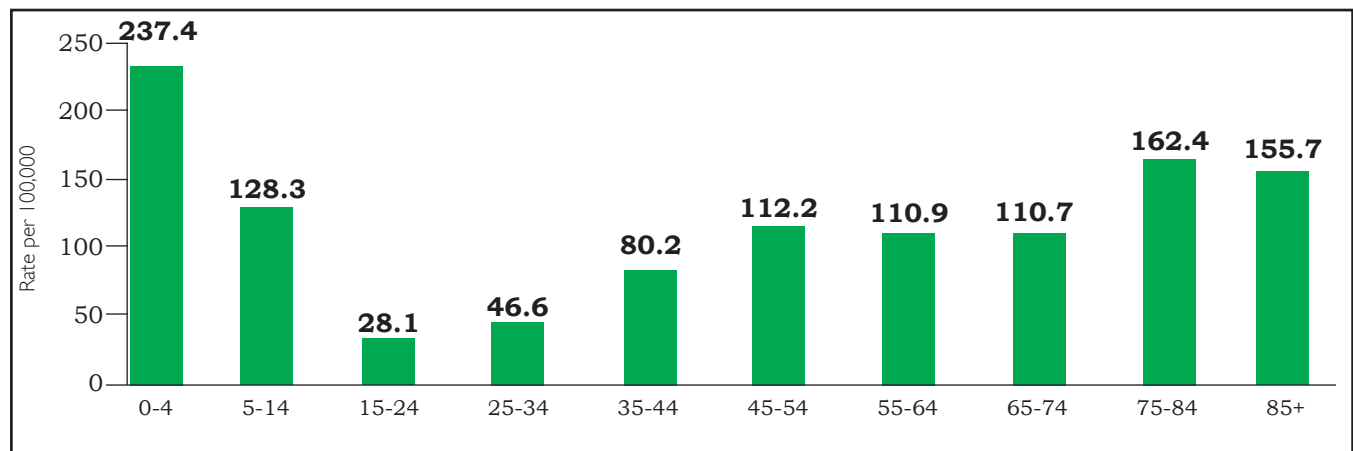


**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents: 2012

In 2012, North Carolina children under age five had the highest asthma hospital discharge rates (237.4 per 100,000). Asthma hospital discharge rates were lowest for residents in the 15 to 24 age group (28.1 per 100,000), as shown in **Figure 10**.

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**Figure 10. Hospital Discharge Crude Rate per 100,000 Population by Age Group, 2012 North Carolina**



**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents: 2012

Asthma hospitalization rates showed geographic variability in 2012. Bertie County had the highest asthma hospital discharge rate of 338.9 hospitalizations per 100,000 residents. Dare County ranked the lowest with a rate of 14.5 asthma hospitalization per 100,000 residents. Among children ages 0 through 14, Lenoir County had the highest asthma discharge rate (507.6 per 100,000) and again, Dare County had the lowest rate with no asthma discharges in 2012 (0.0 per 100,000)<sup>5</sup>. **Tables 7 and 8** present the ten counties with the largest asthma hospitalization rates for all ages (**Table 7**) and for children ages 0 through 14 (**Table 8**).

**Table 7: Counties with the Largest Asthma Hospitalization Rates per 100,000 residents, North Carolina 2012 All Ages**

County	Total Number	Rate per 100,000
BERTIE	70	338.9
EDGECOMBE	162	289.5
ROBESON	365	269.4
RICHMOND	122	261.7
SCOTLAND	91	252.1
LENOIR	146	246.5
MARTIN	41	171.1
HALIFAX	92	170.4
SWAIN	23	162.6
CHOWAN	24	162.5

**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents: 2012<sup>7,8</sup>

\*\* Less than five cases.

**Table 8: Counties with the Largest Asthma Hospitalization Rates per 100,000 residents, North Carolina 2012 Ages 0-14**

County	Total Number	Rate per 100,000
LENOIR	58	507.6
SWAIN	12	450.1
ROBENSON	136	447.8
RICHMOND	40	431.5
EDGECOMBE	44	401.6
SCOTLAND	27	377.6
MARTIN	15	354.9
WASHINGTON	8	348.6
BERTIE	11	332.6
TYRRELL	**	294.1

**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents: 2012<sup>7,8</sup>

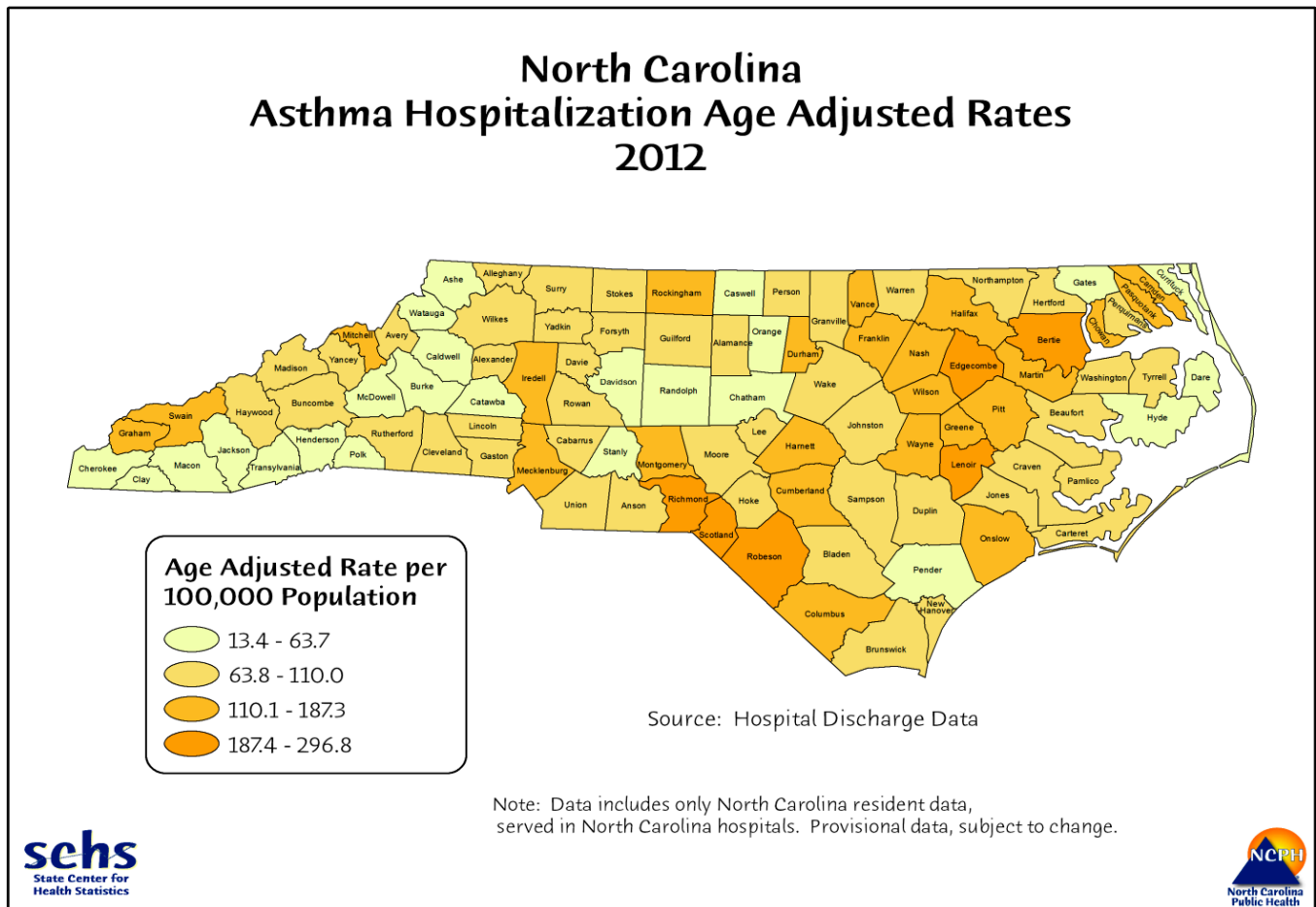
\*\* Less than five cases.

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**Figure 11** presents a map showing 2012 North Carolina age-adjusted hospital discharge rates for asthma by county of residence. Based on this map, hospital discharge rates for asthma are higher on the east part of North Carolina than the west.

**Figure 11**



**Source:** North Carolina State Center for Health Statistics (SCHS). Analysis of Inpatient Hospital Discharge data per 100,000 residents (age-adjusted): 2012

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## Future Topics

Additional data from the North Carolina BRFSS and the North Carolina Childhood Health Assessment and Monitoring Program (CHAMP) will allow us to provide further information on behavioral risk factors, and asthma management and control. We continue to explore other sources of surveillance data and will share asthma-related information of interest with you. As always, we welcome your comments and suggestions on this issue and for future topics. Please contact the North Carolina Asthma Program at 919-707-5213.



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